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The present invention relates to hand tools and particularly, but not exclusively, to screwdrivers.

In the specification of my Australian Patent No. 464,607 there is described and claimed a screwdriver or other hand tool comprising a handle, a tool head of a type which is to be rotated in use and mounting means enabling the tool head to be mounted on the handle so as to permit adjustment of the relative disposition of the handle and tool head.

The present invention is an improvement in or modification of this hand tool.

According to the present invention a hand tool comprises a handle and a tool head secured to said handle, said tool head being of the type which is to be rotated in use, one end of said tool head being pivotally secured to said handle to permit the handle to pivot transversely of the longitudinal axis of the tool head, locking means being provided actuatable to lock the tool handle in any of a plurality of predetermined dispositions relative to the tool head, characterised in that said locking means comprises detent means including a latch member slidably received in a recess or bore in either said handle or said tool head end and biased against said handle or tool head, said tool head end or handle having a row of apertures or notches into each of which the detent member is engageable to effect locking of the head and handle at each of said predetermined positions.

The invention is further described with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a screwdriver constructed in accordance with the invention;

Figure 2 is a fragmentary sectional view of the handle of the screwdriver shown in Figure 1 and its interconnection with the remainder of the screwdriver and taken on a section plane passing transversely through a pivotal coupling of the handle; and

Figure 3 is a cross-section on the line 3-3 in Figure 2.

The screwdriver shown is of the ratchet type. It comprises a rod 140 extending from a ratchet mechanism 142 of known type. The rod is provided at its free end with a conventional screwdriver bit 140a. As usual, the ratchet mechanism is provided with a shank 144 projecting therefrom in a direction opposite to rod 140. In the normal ratchet screwdriver, shank 144 would project into an axial opening in a forward end of cylindrical handle 146 so that the ratchet mechanism and rod are secured to the handle. In the present arrangement, however, the ratchet mechanism and rod are able to pivot relative to the handle so that they can be adjusted to a position such as that shown in Figure 1 in which handle 146 provides a pistol grip. In

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this relative disposition of handle and rod more torque can be applied to the rod than when the handle projects axially of the rod. To enable this positioning of the ratchet mechanism and rod, handle 146 is provided with an elongate slot 148 extending from the front end of the handle towards to the rear thereof. Shank 146 projects into slot 148 and a pivot pin 150 is mounted on the handle so as to extend transversely across slot 148. Shank 144 is provided with a through bore which receives pivot pin 150 so that the shank is pivotally mounted in slot 148. Accordingly, rod 140 and mechanism 142 can be pivoted about pivot pin 150 in directions extending longitudinally of slot 148.

Means is provided for locking the handle in any one of three dispositions relative to the axis of rod 140. Thus, shank 144 is provided on a curved end surface 184 with three notches 186, 188 and 190 arranged at angularly spaced dispositions around the axis of pin 150. A cylindrical detent member 192 is accommodated within a cylindrical bore 194 extending inwardly of handle 146 from an inner end surface 198 of slot 148. Detent member 192 is lengthwise slidable in bore 194 and is biased outwardly of bore 194 by means of a helical compression spring 100 so that a forward end 102 of the member is biased against surface 184. A pin 104 is secured to and projects sidewardly of member 192 and through an elongate opening 196 interconnecting bore 194 and the outer surface of handle 146. This pin carries a knob 108 at its outer end and by manually pressing this lengthwise of the handle towards the rear end of the handle it is possible to

withdraw the detent member 192 away from surface 194 against bias of spring 100.

Detent member 192 is separately engageable with each one of the three notches 186, 188 and 190 to enable the handle to be shifted to the three dispositions relative to the rod 140. In the first of these dispositions (Figures 2 and 3) the handle is aligned with rod 140 and detent member 192 is engaged in notch 190. At the second disposition shown in Figure 1 and by broken lines 120 in Figure 2, the detent member is engaged in notch 186 and the handle and rod are disposed at an angle of about $50-70^{\circ}$ to each other. An intermediate position (not shown) at which the handle and rod are at about 30° to each other is obtainable at which the detent member is engaged with notch 188.

The pivot pin 150 is preferably located at such a location relative to the front end of the handle 146 as to ensure that sufficient space is left to enable easy gripping by the user when the rod is pivoted away from the axially extending disposition. Handle 146 may be provided with the usual ribbing to facilitate gripping by the user. The handle may be made of somewhat small radius than is common in larger types of screwdrivers since the higher torque requirements of the screwdriver will be accommodated by the adjustment of the user's grip on the handle rather than by increased gripping force.

The detent locking mechanism provided by detent member 192 and the co-operating notches 186, 188 and 190 is particularly effective in use, allowing simple and quick adjustment of the position of the handle.

The described construction has been advanced merely by way of explanation and it will be appreciated that many modifications may be made thereto. Thus, whilst it is preferred that the handle be so shaped as to present, when the handle is at one of its angularly disposed dispositions, an outer surface portion 200 (Figure 2) which extends across the rod axis at least to some extent to thereby enable the user to position at least part of his hand over the rod axis this is not essential. Further, the details of the described detent mechanism may be varied. For example, although notches are provided on the shank to co-operate with a detent member housed in the handle this is by no means essential as the positions of these could be reversed, the detent member being housed in shank 144 and the notches being provided on the inner end wall of slot 148. Again, the described construction utilises a ratchet mechanism 142 and whilst it has been found that this provides a particularly satisfactory construction, since it enables a user to impart almost continuous rotational movement to the rod 140 by means of small to and fro rotational movements imparted to the handle, this is not essential.

Whilst the invention has been described with particular reference to screwdrivers, it is of course equally applicable to other kinds of hand tools.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS

1. A hand tool comprising a handle and a tool head secured to said handle, said tool head being of the type which is to be rotated in use, one end of said tool head being pivotally secured to said handle to permit the handle to pivot transversely of the longitudinal axis of the tool head, locking means being provided actuatable to lock the tool handle in any of a plurality of predetermined dispositions relative to the tool head, characterised in that said locking means comprises detent means including a latch member slidably received in a recess or bore in either said handle or said tool head end and biased against said handle or tool head, said tool head end or handle having a row of apertures or notches into each of which the detent member is engageable to effect locking of the head and handle at each of said predetermined positions.
2. A hand tool as claimed in claim 1, wherein said handle is provided with an elongated slot which receives the end of the tool head, a pivot pin being located transversely of said slot and arranged to extend through the end portion of said tool end so as to permit the handle to pivot relative to the tool head.
3. A hand tool as claimed in either claim 1 or 2, wherein the member is located in a recess in said handle and the notches are positioned in the end of said tool head.
4. A hand tool as claimed in claim 3, wherein said member has a portion extending externally of the handle and manually engageable to effect sliding movement of the member against said

resilient bias to release locking of the head and handle.

5. A hand tool as claimed in any preceding claim wherein said tool head incorporates one-way clutch means operable to allow turning of the handle to impart turning movement to the tool head only when the handle is turned in one rotational direction.

6. A hand tool as claimed in any one of the preceding claims wherein said tool head is arranged to detachably receive a tool bit.

7. A hand tool as claimed in any one of the preceding claims wherein the locking means is capable of locking the tool handle in three positions relative to the tool head the relative inclination of the tool handle and head being between 30° and 70° .

8. A hand tool substantially as herein described with reference to and as illustrated in the accompanying drawings.

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